REMARKS

Claims 1 and 4 are amended. The amendments are supported by the application as originally filed, for example, page 14 line 23 to page 15 line 18 and figures 2, 3 and 4. No new matter is added by the amendments.

Claim 4 is rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Applicants traverse the rejection to the extent that it can be maintained.

Claim 4 is amended to provide proper antecedent basis. Applicants request that the rejection be withdrawn.

Claims 1, 7 and 9 are rejected under 35 U.S.C. §103(a) as being unpatentable over Trocciola et al (US 5,330,727) in view of De Rycker et al. (US 2,887,365). Applicants traverse the rejection to the extent that it can be maintained.

Applicants claim a CO removing device that provides improved selectivity in removal of CO, i.e. less undesirable side reaction, and a simpler structure for the device than prior art devices. Hydrogen gas containing CO is passed through a selective oxidative catalyst bed (SOCB) at a temperature range of about 140-190°C. A temperature lower than this range becomes inefficient to remove CO, and a temperature higher than this range tends to promote side reactions such as combustion of hydrogen (Background of the Invention). However, it is difficult to control the temperature of the SOCB across the width of the bed. The temperature of the portion of the bed adjacent the walls of a vessel (peripheral part) containing the bed tends to be relatively low while the bed toward the middle of the vessel (central part) tends to be relatively high. Applicants discovered that by cooling an upstream portion of the SOCB so that the central part of the bed is in the desired temperature range, then blending gas from the peripheral part and central part of the bed before passing the gas into a downstream portion of the bed that is not cooled, a high selectivity of CO removal is achieved.

The claimed structure provides a simple means to regulate the temperature of the bed and gas from an upstream to a downstream part of the SOCB and to avoid the undesirable side reactions. A gas blending unit within the SOCB projects inward from the inner surface of a gas passing tube that contains the SOCB so as to partially obstruct the gas passing tube. A cooling mechanism is disposed upstream of the gas blending unit. The structure provides the improved selectivity in removal of CO.

Trocciola et al. (US '727) disclose a device for removing CO from a gas stream by passing the gas through two separated catalyst beds **22/32** connected in series by a conduit **18**. The temperature of each catalyst bed is controlled at a different temperature by cooling coils embedded in the respective beds (column 5 line 62 to column 6 line 59). Trocciola et al. do not disclose a gas blending unit formed from an element projecting inward from the inner surface of the gas passing tube, do not disclose that the gas blending unit is within the SOCB bed and do not to disclose a double-walled cylinder having an annular clearance and do not disclose a cooling mechanism for cooling the selective oxidative catalyst bed with cooling water passing through the annular clearance.

Applicants respectfully submit that the Office Action mischaracterizes some of the elements of Trocciola et al. For example, the Office Action identifies elements **18/15** as gas blending units. Element **18** is a conduit between containers **21/31** (column 4 lines 53-62). Gases exiting SOCB **22** would be substantially uniform in composition and any blending performed by **18** would have a trivial effect on the performance of SOCB **32**. Even if element **18** were considered a gas blending unit, a point the Applicants do not concede, it is not within the SOCB as claimed. Element **15** (fuel cell fuel supply conduit) is downstream of the SOCB and any blending would be irrelevant to the performance of the SOCB (column lines 47-53).

De Rycker et al. fail to remedy the deficiencies in the teaching of Trocciola et al. De Rycker et al. (US '365) disclose a catalytic reactor wherein a catalytic reaction cartridge **3** is contained within a tube **1** with an annular space therebetween. Gas to be treated is introduced to the reactor at an opening **5** at the base of the tube and passes through the annular space **6** to the top of the cartridge. The gas then passes through a tubular assembly to the base of the cartridge wherein it is directed up through a catalyst bed to a discharge port. Note that the annular space is an integral feature of the device of US '365 that enables pre-heating of incoming gas prior to entering the catalyst bed while also cooling the catalyst bed (column 4 line 30-42).

References are not combinable if the proposed modification renders the prior art invention unsuitable for its intended purpose. *In re Fritch*, 972 F.2d 1260 n. 12, 23 USPQ2d 1780 n. 12 (Fed.Cir 1992); *In re Ratti* 270 Fed.2d 810, 123 USPQ 349 (CCPA 1959); MPEP 2143.01. Combining the structure of De Rycker et al. with the structure of Trocciola et al. results in a tube enclosing both of the catalyst beds disclosed by Trocciola et al. (There is no teaching to selectively enclose one of the SOCBs of Trocciola et al.) Such a combined structure

defeats the object of Trocciola et al. by regulating both catalyst chambers at the same temperature. Note that the Office Action at the top of page 4 acknowledges that the device of De Rycker et al offers the advantage of providing the reactor with an even temperature throughout the catalyst bed. The combined structure does not satisfy the limitation of claim 1 that the cylinder is disposed upstream from a gas blending unit. There is no teaching or suggestion by either reference to selectively cool only one of the SOCBs taught by Trocciola et al.

Claim 1 recites "a cooling mechanism for cooling the selective oxidative catalyst bed with cooling water passing through the annular clearance". De Rycker et al. do not disclose a structure to perform the function specified in the claim. The annular space of De Rycker et al. is a gas passing means that pre-heats incoming gas. Passing cooling water through the annular space would contaminate the catalytic reactor of the De Rycker et al. device and defeat its function. The Office Action refers to column 1, lines 15-22 for the proposition that the annular space **6** between tube **1** and the catalytic reactor cartridge is formed for a cooling liquid to pass through. Applicants respectfully submit that the cited passage does not provide the stated teaching. The passage simply states that the object of the De Rycker et al. invention is to provide an improved reactor for heterogeneous catalytic reactions. Further, Applicants are unable to identify any portion of De Rycker et al. that teaches that the annular space **6** is suitable for passing cooling water.

As noted above, the device of Trocciola et al. includes cooling coils in each SOCB. There is no motivation to provide redundant cooling by enclosing the device of Trocciola et al. with the tube disclosed by De Rycker et al. For the reasons stated, the combination of Trocciola et al. with De Rycker et al. results in a device that lacks both function and purpose.

Applicants respectfully submit that the combined structures of Trocciola et al. and De Rycker et al. fail to teach all of the limitations of the claim 1, and that if the references are combined, the combination defeats the purpose and function of the devices disclosed by the references. Applicants submit that claim 1 is allowable over Trocciola et al. and De Rycker et al. alone or in combination and request that the rejection be withdrawn.

Claims 4 and 7-12 depend directly or indirectly from claim 1 and are therefore likewise allowable.

In view of the above amendments and remarks, Applicants respectfully request a Notice of Allowance. If the Examiner believes a telephone conference would advance the prosecution

of this application, the Examiner is invited to telephone the undersigned at the below-listed telephone number.

Respectfully submitted,

MERCHANT & GOULD P.C.
P.O. Box 2903
Minneapolis, Minnesota 55402-0903
(612) 332-5300

Date: 24 April 2006

Brian H. Batzli
Reg. No. 32,960
BHB:TO:PLSkaw